



*Georgia Department of Public Health*

# **An Ounce of Prevention is Worth a Pound of Cure**

## **Protecting Yourself and Others from Disease Exposures**



Presentation to: First Responder Community

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# Objectives

- Overview of definitions, routes of transmission, transmission based precautions
- Describe essential elements of Infection Prevention Programs/ Fostering a "Safe System of Care"
- Familiarize participants with common occupational exposures to communicable and infectious diseases
  - Diseases to be aware of, in Georgia
- Familiarize participants with exposure prevention strategies
  - Training/ Education
    - Work practice controls
  - Vaccination
- Post exposure recommendations

# Definitions

- *Communicable diseases* can be passed from one person to another
- *Infectious diseases* may cause illness in a person but are not necessarily communicable
- Exposure  $\neq$  infection (necessarily)
  - Variety of factors influence
    - Agent
    - Host
    - Route of Transmission
    - Environment

<http://www.ncbi.nlm.nih.gov/books/NBK7993/>

# Modes of Transmission: Airborne

- Transmission occurs through very small particles containing infectious agents that can remain suspended in air for long periods of time
- When inhaled by a susceptible individual, particles enter the respiratory tract and can cause infection.
- Air currents may disperse particles over long distances
  - airborne transmission does not require face-to-face contact with an infected individual
- Transmission only occurs with infectious agents that are capable of surviving and retaining infectivity for relatively long periods of time in airborne particles
- Only a limited number of diseases are transmissible via the airborne route
- Two examples of airborne transmissible agents
  - *Mycobacterium tuberculosis* which causes tuberculosis (TB)
  - Rubella virus which causes measles

[https://www.osha.gov/SLTC/healthcarefacilities/infectious\\_diseases.html](https://www.osha.gov/SLTC/healthcarefacilities/infectious_diseases.html)

# Airborne Precautions

- Apply to patients known or suspected to be infected with a pathogen that can be transmitted by airborne route; these include, but are not limited to:
  - Tuberculosis
  - Measles
  - Chickenpox (until lesions are crusted over)
  - Localized (in immunocompromised patient) or disseminated herpes zoster (until lesions are crusted over)
- Place the patient immediately in an airborne infection isolation room (AIIR)
- **If an AIIR is not available:**
  - **Provide a facemask (e.g., procedure or surgical mask) to the patient and place the patient immediately in an exam room with a closed door**
  - **Instruct the patient to keep the facemask on while in the exam room, if possible, and to change the mask if it becomes wet**
  - **Initiate protocol to transfer patient to a healthcare facility that has the recommended infection-control capacity to properly manage the patient**
- **PPE use:**
  - **Wear a fit-tested N-95 or higher level disposable respirator, if available, when caring for the patient; the respirator should be donned prior to room entry and removed after exiting room**
  - **If substantial spraying of respiratory fluids is anticipated, gloves and gown as well as goggles or face shield should be worn**
- **Perform hand hygiene before and after touching the patient and after contact with respiratory secretions and/or body fluids and contaminated objects/materials; *note:* use soap and water when hands are visibly soiled (e.g., blood, body fluids)**

# Modes of Transmission: Droplet

- Droplets containing infectious agents are generated when an infected person coughs, sneezes, or talks
  - or during certain medical procedures, such as suctioning or endotracheal intubation
  - Exposure to droplets generated in this way may occur if droplets come into direct contact with the mucosal surfaces of the eyes, nose, or mouth of a susceptible individual
- **Droplets are too large to be airborne for long periods of time**, and droplet transmission does not occur through the air over long distances
- Two examples of droplet transmissible infectious agents are the influenza virus which causes the seasonal flu and *Bordetella pertussis* which causes pertussis (i.e., whooping cough)

[https://www.osha.gov/SLTC/healthcarefacilities/infectious\\_diseases.html](https://www.osha.gov/SLTC/healthcarefacilities/infectious_diseases.html)

# Droplet Precautions

- Apply to patients known or suspected to be infected with a pathogen that can be transmitted by droplet route; these include, but are not limited to:
  - Respiratory viruses (e.g., influenza, parainfluenza virus, adenovirus, respiratory syncytial virus, human metapneumovirus)
  - Bordetella pertussis
  - For first 24 hours of therapy: *Neisseria meningitides*, group A streptococcus
- Place the patient in an exam room with a closed door as soon as possible
- PPE use:
  - Wear a facemask, such as a procedure or surgical mask, for close contact with the patient; the facemask should be donned upon entering the exam room
  - If substantial spraying of respiratory fluids is anticipated, gloves and gown as well as goggles (or face shield in place of goggles) should be worn
- Perform hand hygiene before and after touching the patient and after contact with respiratory secretions and contaminated objects/materials; *note*: use soap and water when hands are visibly soiled (e.g., blood, body fluids)
- Instruct patient to wear a facemask when exiting the exam room, avoid coming into close contact with other patients, and practice respiratory hygiene and cough etiquette

<http://www.cdc.gov/HAI/settings/outpatient/basic-infection-control-prevention-plan-2011/transmission-based-precautions.html>

# Modes of Transmission: Contact

- **Direct contact**

- Transmission occurs when infectious agents are transferred to a susceptible individual through physical contact with infected individual
- (e.g., direct skin-to-skin contact)

- **Indirect contact**

- Transmission occurs when infectious agents are transferred to a susceptible individual when the individual makes physical contact with contaminated items and surfaces
- (e.g., door knobs, patient-care instruments or equipment, bed rails, examination table)

- Two examples of contact transmissible infectious agents

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Hepatitis B

[https://www.osha.gov/SLTC/healthcarefacilities/infectious\\_diseases.html](https://www.osha.gov/SLTC/healthcarefacilities/infectious_diseases.html)



# Contact Precautions

- Apply to patients with any of the following conditions and/or disease:
  - Presence of stool incontinence (may include patients with norovirus, rotavirus, or *Clostridium difficile*), draining wounds, uncontrolled secretions, pressure ulcers, or presence of ostomy tubes and/or bags draining body fluids
  - Presence of generalized rash
- Perform hand hygiene before touching patient and prior to wearing gloves
- PPE use:
  - Wear gloves when touching the patient and the patient's immediate environment or belongings
  - Wear a gown if substantial contact with the patient or their environment is anticipated
- Perform hand hygiene after removal of PPE; *note*: use soap and water when hands are visibly soiled (e.g., blood, body fluids), or after caring for patients with known or suspected infectious diarrhea (e.g., *Clostridium difficile*, norovirus)

# Standard Precautions

- Standard Precautions are the minimum infection prevention practices that apply to all patient care... in any setting where healthcare is delivered
- These practices are designed to both protect Healthcare Workers (HCW) and prevent HCW from spreading infections among patients
- Standard Precautions include:
  - Hand hygiene
  - Use of personal protective equipment (e.g., gloves, gowns, masks), safe injection practices
  - Safe handling of potentially contaminated equipment or surfaces in the patient environment
  - Respiratory hygiene/cough etiquette

# Guide to Infection Prevention in Emergency Medical Services, 2013

- System level as well as individual level safety
  - Practical, actionable advice/ recommendations to avoid exposure to infectious/ communicable diseases
  - Recommendations for follow up courses of action in the event of an exposure
  - Includes recommendations for Emergency Medical Services (EMS), Fire and Public Safety
- Association of Professionals in Infection Control and Epidemiology, Inc. (APIC)

[http://www.apic.org/Resource/\\_EliminationGuideForm/e1ac231d-9d35-4c42-9ca0-822c23437e18/File/EMS\\_Guide\\_web.pdf](http://www.apic.org/Resource/_EliminationGuideForm/e1ac231d-9d35-4c42-9ca0-822c23437e18/File/EMS_Guide_web.pdf)

# Incidents that may expose First Responder's to an Infectious or Communicable Disease

- Fires
- Forcible entries
- Explosions
- Social problem intervention
- Scene clean up, decontamination and disposal
- Extrications
- Water rescue
- Emergency medical calls
- Hazmat related calls and disposition

# Essential Elements of Infection Prevention Programs/ Safe System of Care

- **Administrative Controls:** Policies and procedures in the workplace designed to limit exposures
  - Written plan, updated annually
- **Engineering Controls:** ensuring facilities and equipment foster safe practices
  - Hand washing stations, decontamination stations, availability of sharps containers, etc.
- **Work Practice Controls:** practices or actions that all personnel are expected to observe
  - Hand washing before and after patient care, disposal of sharps containers when  $\frac{3}{4}$  full, not storing food in refrigerator with potentially infectious materials or medications, etc.

# Essential Elements of Infection Prevention Programs/ Fostering a “Safe System of Care”

- **Education and training:**

- Initial training, annual refresher, and for emergent situations/ diseases, e.g. bloodborne pathogens
- Appropriate use of and access to Personal Protective Equipment (PPE)
- Communication of hazards to personnel
  - **Situational Awareness of diseases prevalent in the jurisdiction**

<https://www.osha.gov/SLTC/personalprotectiveequipment/>

- **Medical Management**

- Documentation of sharps, other exposures
- Follow up assessment and care of personnel policies following an exposure

- **Vaccine/ Immunization Programs**

- Hepatitis B vaccination
- Influenza, etc.

# Diseases that First Responders May be Exposed to

Transmitted by contact or body fluid exposures	Transmitted via airborne route	Transmitted by aerosolized droplet
Hepatitis B (HBV)*	Measles*	Diphtheria*
Hepatitis C (HCV)	Tuberculosis	Influenza*/ Novel Influenza A
Human Immunodeficiency Virus (HIV)	Varicella* disease- chicken pox, zoster	Meningococcal Disease
Rabies		Mumps*
Vaccinia		Pertussis*
Anthrax		Plague (pneumonic)
Viral Hemorrhagic Fevers		Rubella (German Measles)*
MRSA		SARS-CoV/ MERS CoV
Tetanus*		

# Hepatitis B Virus (HBV)

- Prevalence of chronic HBV in Georgia
  - Varies by race, ethnicity, age group, geographic location and history of risk behaviors
    - Casual and unprotected sex, having medical procedures in countries where blood may not be screened, or through obtaining tattoos or having acupuncture
  - Ranges between 4 cases per 100,000 up to 34.5 per 100,000 persons in varying health districts
- Transmission
  - Percutaneous or mucosal exposure to blood and body fluids
- Exposures that pose a risk for susceptible responders
  - Needlestick injury for Healthcare Workers (HCW)
  - Wound, non-intact skin or intact mucous membrane exposure to blood or body fluids
- HBV is viable for 7 days on environmental surfaces, at room temperature

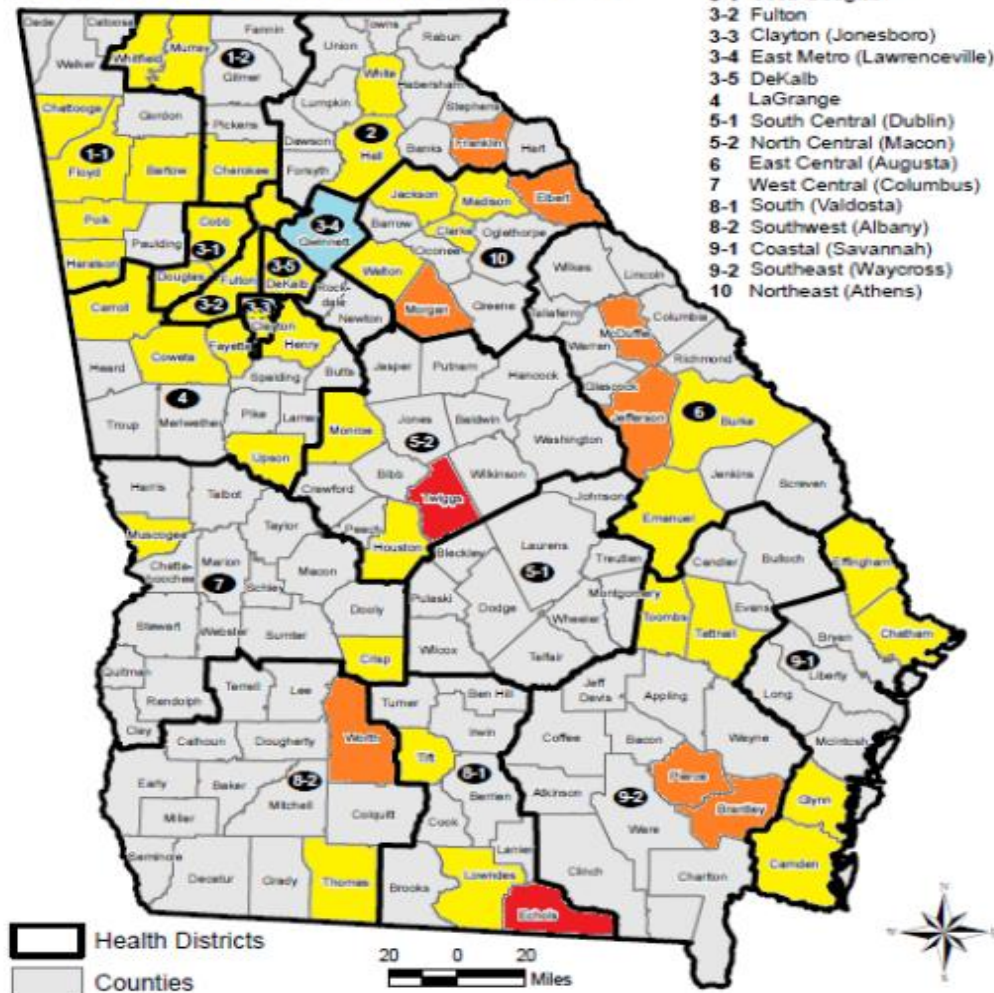


“...This infection is present in the population throughout Georgia. The chronic infections serve as a reservoir to infect others. Therefore emergency **responders statewide are likely to come in contact with the blood of an infected person and must practice standard precautions.** In addition to blood exposure, the hepatitis B virus is very easily transmitted through sexual contact with an infected person, so people need to be careful in their personal lives also. **Hepatitis B vaccination** is recommended.”

- Lynne Mercedes, *Hepatitis Program Director, Georgia Department of Public Health*

# Hepatitis B Incidence Rates,\* 2013

## GEORGIA Public Health Districts



Georgia - 1.0

\*per 100,000 population

<1

1-4

5-9

≥10

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# Hepatitis C Virus (HCV)

- Prevalence in Georgia
  - Varies by race, ethnicity, age group, geographic location and history of risk behaviors
- Transmission
  - Exposure to large amounts of blood or repeated, direct percutaneous exposures to blood (transfusions or injection drug use)
  - RARELY occurs through mucous membrane exposure to blood
  - RARELY occurs through exposure to body fluids other than blood
- Exposures that pose a risk to responders
  - In a bombing or mass casualty event, extensive disrupted skin and exposure to significant volume of blood increase risk
- HCV is viable in the environment for at least 16, and possibly 23 hours

"Aging Baby Boomers (take) their infections with them into nursing homes. ...inform your emergency responders that regardless of where in GA they work, the Baby Boomer generation represents approx. 75% of all Hep C infections. If they are responding to and assisting persons of this generation (born between 1945 and 1965), they need to wear their PPE when there's a potential for blood exposure"

– Lynne Mercedes, *Hepatitis Program Director, Georgia Department of Public Health*

[http://www.hepmag.com/articles/hepatitis\\_nursing\\_homes\\_2831\\_26378.shtml](http://www.hepmag.com/articles/hepatitis_nursing_homes_2831_26378.shtml)

# Human Immunodeficiency Virus (HIV)

- Prevalence in Georgia
  - Wide geographic variability, varies greatly among subpopulations within the same community
  - Overall, 508 cases per 100,000
    - Higher in Clayton Health District, 684 cases per 100,000
    - Higher in Dekalb Health District 1,093 cases per 100,000
    - Higher in Fulton Health District, 1,489 per 100,000
- Transmission
  - Sexual contact, or sharing of injection drug use equipment
  - Needlestick for HCW
- Exposures that pose a risk to responders
  - Percutaneous injuries, contact of mucous membranes, or contact of nonintact skin with potentially infected fluids

[https://dph.georgia.gov/sites/dph.georgia.gov/files/HIV\\_EPI\\_2012\\_Surveillance\\_Summary\\_03.28.2014.pdf](https://dph.georgia.gov/sites/dph.georgia.gov/files/HIV_EPI_2012_Surveillance_Summary_03.28.2014.pdf)

# Influenza

- **How flu spreads**

- Mainly by droplets expelled when people with flu cough, sneeze or talk
- Droplets can land in the mouths or noses of people who are nearby
- Or someone may be exposed to flu by touching a surface or object that has flu virus on it and then touching their own mouth, eyes or nose

- **Period of contagiousness**

- Flu may be transmissible before you know you are sick, as well as while you are sick
- Most healthy adults may be able to infect others beginning 1 day **before** symptoms develop and up to 5 to 7 days **after** becoming sick
- Some people, especially young children and people with weakened immune systems, might be able to infect others for an even longer time

- *Over a period of 30 years, between 1976 and 2006, **estimates of flu-associated deaths in the United States range from a low of about 3,000 to a high of about 49,000 people \*each year\****

<http://www.cdc.gov/flu/keyfacts.htm>

# Tuberculosis

- Prevalence
  - Estimated at 3.4 cases per 100,000 persons, in Georgia
  - Up to 11.1 per 100,000 in Dekalb Health District
- Transmission
  - Airborne
  - PPE: **Wear a fit-tested N-95 or higher level disposable respirator, if available, when caring for the patient; the respirator should be donned prior to room entry and removed after exiting room**
- Public Health has implemented isolation and quarantine orders to ensure that non-compliant TB patients do not expose others

[http://dph.georgia.gov/sites/dph.georgia.gov/files/2013%20GA%20TB%20Report%20FINAL\\_0.pdf](http://dph.georgia.gov/sites/dph.georgia.gov/files/2013%20GA%20TB%20Report%20FINAL_0.pdf)

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Methicillin-resistant  
staphylococcus aureus

<http://www.bing.com/images/search?q=MRSA+cartoons&qsn=&form=QBIR&pq=mrsa+cartoons&sc=1-13&sp=-1&sk=#view=detail&id=92889E75A63A3358650614D1F5E90E2EB4B6845C&selectedIndex=3>

# Methicillin Resistant Staphylococcus Aureus (MRSA)

- Recent study indicated that EMS personnel were more likely to carry MRSA than the average person
- Uniquely poised to acquire and transmit MRSA infection between hospital and community
- 70% of ambulances in Chicago contained at least one strain of S. aureus bacteria
- Greater emphasis on decontamination of ambulances and equipment needed/ provided
- Majority of the nasal MRSA/S aureus isolates were genetically related to the environmental MRSA strains
- Findings suggest possible transmission between personnel and the environmental surfaces

<http://www.ncbi.nlm.nih.gov/pubmed/21324550>

<http://deohs.washington.edu/news/mrsa-exposure-firefighters-medics-greater-general-public-uw-study>

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# Animal Bites/ Rabies

- Importance of public health risk assessment following animal bite
- Post Exposure Prophylaxis when animal's status is positive for rabies or unknown
- Vaccination may be an option for workers routinely dealing with animals

# Exposure Prevention Strategies

## EMS

- **Work Practices**

- **Hand Washing**\*\*\*
- **Standard Precautions- all patient contact**
  - Hand hygiene
  - Gloves
  - Gown
  - Mask
  - Eye protection/ face shield
- Safe injection practices
- Personal Protective Equipment according to exposure

- Respiratory etiquette

- Education
- Source control
- Hand hygiene
- Spatial separation

- Cleaning and disinfection of vehicles and equipment

- **Environmental controls**

- Self sheathing IV catheters
- Puncture proof containers, etc.
- Hand washing stations
- Single use devices

# Exposure Prevention Strategies

## Law Enforcement and Corrections

- If blood present or suspect/ inmate is combative, put on gloves as soon as possible
- Wear protective gloves for body searches to avoid hypodermic needle exposure, etc.
- Use evidence tape instead of staples to seal evidence bags to avoid puncturing gloves
- Do not handle personal items while wearing contaminated gloves
- Use puncture proof containers to store sharp instruments

# Exposure Prevention Strategies

- Disinfection Procedures
  - In a designated space meeting Occupational Safety and Health Administration (OSHA) standards
  - Environmental Protection Agency (EPA) approved disinfectants and/ detergents
  - **DO NOT use bathrooms, kitchens or living areas to decontaminate or store patient care equipment or infectious waste**
- Equipment decontamination should be conducted according to manufacturer's recommendations

# Vaccination

- All responders:
  - Follow Advisory Committee on Immunization Practices (ACIP) recommendations for adults



<http://www.cdc.gov/vaccines/hcp/acip-recs/index.html>

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## Recommended Adult Immunization Schedule—United States - 2014


**Note:** These recommendations must be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.


**Figure 1. Recommended adult immunization schedule, by vaccine and age group<sup>1</sup>**

VACCINE ▼	AGE GROUP ►	19-21 years	22-26 years	27-49 years	50-59 years	60-64 years	≥ 65 years
Influenza <sup>2,*</sup>		1 dose annually					
Tetanus, diphtheria, pertussis (Td/Tdap) <sup>3,*</sup>		Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs					
Varicella <sup>4,*</sup>		2 doses					
Human papillomavirus (HPV) Female <sup>5,*</sup>		3 doses					
Human papillomavirus (HPV) Male <sup>5,*</sup>		3 doses					
Zoster <sup>6</sup>						1 dose	
Measles, mumps, rubella (MMR) <sup>7,*</sup>		1 or 2 doses					
Pneumococcal 13-valent conjugate (PCV13) <sup>8,*</sup>		1 dose					
Pneumococcal polysaccharide (PPSV23) <sup>9,10</sup>		1 or 2 doses					1 dose
Meningococcal <sup>11,*</sup>		1 or more doses					
Hepatitis A <sup>12,*</sup>		2 doses					
Hepatitis B <sup>13,*</sup>		3 doses					
<i>Haemophilus influenzae</i> type b (Hib) <sup>14,*</sup>		1 or 3 doses					

\*Covered by the Vaccine Injury Compensation Program

 For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster

 Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indication)

 No recommendation

Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at [www.vaers.hhs.gov](http://www.vaers.hhs.gov) or by telephone, 800-822-7967.

Information on how to file a Vaccine Injury Compensation Program claim is available at [www.hrsa.gov/vaccinecompensation](http://www.hrsa.gov/vaccinecompensation) or by telephone, 800-338-2382. To file a claim for vaccine injury, contact the U.S. Court of Federal Claims, 717 Madison Place, N.W., Washington, D.C. 20005; telephone, 202-357-6400.

Additional information about the vaccines in this schedule, extent of available data, and contraindications for vaccination is also available at [www.cdc.gov/vaccines](http://www.cdc.gov/vaccines) or from the CDC-INFO Contact Center at 800-CDC-INFO (800-232-4636) in English and Spanish, 8:00 a.m. - 8:00 p.m. Eastern Time, Monday - Friday, excluding holidays.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

The recommendations in this schedule were approved by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), American College of Obstetricians and Gynecologists (ACOG) and American College of Nurse-Midwives (ACNM).



# What to do following...

- Blood or body fluid **spill**
  - Wear PPE to clean it up!
  - Use super absorbent pads to soak up liquid
  - Carefully place pad in red biohazard bag
  - Use disinfectant, according to manufacturer's instructions, on affected area
  - Rinse area, if indicated by manufacturer's instructions
  - WASH HANDS with soap and water

# What to do following...

- Skin exposure to blood or body fluids
  - Immediately wash affected area with soap and water for at least 15 seconds
  - Examine skin for breaks, chapping and cover nonintact skin with dressing
  - Do NOT use strong chemical solutions to disinfect skin
- Mucous membrane exposure to blood or body fluids
  - Decontaminate by rinsing with large quantities of water or saline solution for 2 minutes
  - Rinse/ irrigate affected eye(s) with water or saline solution for 3 minutes
- If you have an exposure to blood or another body fluid- report it immediately to your supervisor
- Essential to have medical evaluation
  - Post exposure prophylaxis
  - Protect household members from exposure



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# For More Information

- *Guide to Infection Prevention in Emergency Medical Services, 2013*
  - Association for Professionals in Infection Control and Epidemiology (APIC)
  - [http://apic.org/Resource/\\_EliminationGuideForm/e1ac231d-9d35-4c42-9ca0-822c23437e18/File/EMS\\_Guide\\_web.pdf](http://apic.org/Resource/_EliminationGuideForm/e1ac231d-9d35-4c42-9ca0-822c23437e18/File/EMS_Guide_web.pdf) , accessed 11-7-14
- *Recommendations for Postexposure Interventions to Prevent Infection with Hepatitis B Virus, Hepatitis C Virus, or Human Immunodeficiency Virus and Tetanus in Persons Wounded During Bombing and Similar Mass Casualty Events- United States, 2008*
  - Morbidity and Mortality Weekly Report (MMWR), August 1, 2008/Vol.57/No.RR-6
  - <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5706a1.htm> , accessed 11-7-14
- *Preventing Exposures to Bloodborne Pathogens among Paramedics*
  - Workplace Solutions, from the National Institute for Occupational Safety and Health
  - <http://www.cdc.gov/niosh/docs/wp-solutions/2010-139/pdfs/2010-139.pdf> , accessed 11-7-14
- *2012 Georgia Tuberculosis Report*
  - Georgia Department of Public Health, Atlanta, Georgia, October 2013
  - [http://dph.georgia.gov/sites/dph.georgia.gov/files/related\\_files/document/2012%20GA%20TB%20Report%20FINAL.docx](http://dph.georgia.gov/sites/dph.georgia.gov/files/related_files/document/2012%20GA%20TB%20Report%20FINAL.docx) , accessed 11-7-14
- *HIV Surveillance Summary, Georgia, 2012*
  - Georgia Department of Public Health, Atlanta, Georgia
  - [https://dph.georgia.gov/sites/dph.georgia.gov/files/HIV\\_EPI\\_2012\\_Surveillance\\_Summary\\_03\\_28.2014.pdf](https://dph.georgia.gov/sites/dph.georgia.gov/files/HIV_EPI_2012_Surveillance_Summary_03_28.2014.pdf) , accessed 11-7-14

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